

Remarks

This Amendment is in response to a Final Rejection in an Office Action dated March 31, 2006 and to subsequent Advisory Action dated September 19, 2006. Enclosed with this amendment is additional data which proves the unexpected synergistic effects present in the claimed composition. Some of the data is a clearer version of previously presented data requested by Examiner and table D is new experimental data provided to address concerns mentioned by Examiner. Because this data in conjunction with the currently amended claims address all of the issues raised in the Office Action and the Advisory Action, Applicant believes that the claims are now in condition for allowance.

The previous Office Action stated that the claims would be considered non-obvious over US Patent Application No. 2001/0003672A1 (hereinafter Inoue) in view of US 5,352,277 (hereinafter Sasaki) if it could be proven that an unexpected synergism were present in the claims. Subsequent to the Final Rejection, Applicant re-submitted tables A and B and submitted supplemental data tables C and 1-12 (currently re-presented as tables C-1 through C-12) to substantiate that unexpected synergism occurs for all of the possible combination permutations contemplated by the claims. The subsequent Advisory Action conceded that an unexpected synergism does occur for some of the claimed ranges in the composition but because too much of the claimed range is not specifically proven, the data cannot be said to be representative of the entire claimed range. In addition the Advisory Action took issue with the alleged paucity of data beyond the claimed range which would act as a control to show that the unexpected synergistic results are in fact due to the claimed combination.

As the following explanation details, the instant claims describe a range that is overwhelmingly supported by the previously presented data combined with new table D. In

addition, new table D combined with previously submitted data shows that significantly beyond the instantly claimed range the unexpected synergistic effects do not occur:

Ammonia weight%

The instant claims recite ammonia in a range of between 0.02% and 4% by weight. Tables A, C, C1-C12, and D provide sufficient *representative data* to show that ammonia within this range displays unexpected synergistic effects. Table D line 3 shows the lower end of this range for one possible combination of PEO and HEC does display unexpected synergistic effects. Table D line 4 shows the upper end of this range for one possible combination of PEO and HEC also displays unexpected synergistic effects. Tables A, C, C1-C12, and D show ammonia in a middle value in the range displays unexpected synergistic effects for majority of the possible combinations of HEC and PEO. In addition, lines 2 and 5 in table D show that ammonia below this range (line 2) and above this range (line 5), do not displays unexpected synergistic effects.

HEC weight%

The instant claims recite HEC (hydroxyethyl cellulose) in a range of between 0.05% and 2% by weight. Tables A, C-4, C-5, C-6, and D provide sufficient *representative data* to show that HEC within this range displays unexpected synergistic effects. These tables show that at both of the endpoints and within the claimed range of HEC with a number of PEO and ammonia combinations, unexpected synergistic effects occur. In addition, line 8 in Table D shows that HEC below the claimed range does not displays unexpected synergistic effects.

PEO weight%

The instant claims recite PEO (polyethylene oxide) in a range of between 0.005% and 5% by weight. Tables A, C-10, C-11, C-12, and D provide sufficient *representative data* to

show that HEC within this range displays unexpected synergistic effects. These tables show that at both of the endpoints and within the claimed range of PEO with a number of HEC and ammonia combinations, unexpected synergistic effects occur. In addition, lines 10 and 11 in Table D shows that PEO below the claimed range does not displays unexpected synergistic effects.

HEC molecular weight

The instant claims recite HEC having a molecular weight in a range of between 300,000 and 2,000,000. Tables A, C-1, C-2, C-3, and D provide sufficient *representative data* to show that HEC within this range displays unexpected synergistic effects. These tables show that at both of the endpoints and within the claimed range of HEC with a number of PEO and ammonia combinations, unexpected synergistic effects occur. In addition, line 6 in Table D shows that HEC below the claimed range does not displays unexpected synergistic effects.

PEO molecular weight

The instant claims recite PEO having a molecular weight in a range of between 50,000 and 10,000,000. Tables A, C-7, C-8, C-9, and D provide sufficient *representative data* to show that HEC within this range displays unexpected synergistic effects. These tables specifically show that PEO having a molecular weight between 80,000 and 8,000,000 with a number of HEC and ammonia combinations, unexpected synergistic effects occur. The provided data represents almost 80% of the claimed range and is sufficient to extrapolate the full breadth of the claims. In addition, line 10 in table D shows that below the claimed range synergistic effects occur and line 11 in Table D shows that above the claimed range no synergistic effects occur.

Conclusion

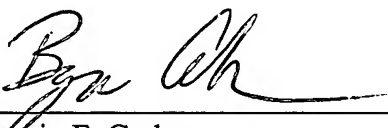
Based on at least the foregoing Remarks, Applicant respectfully submits that all of the claimed ranges in base claim 1 display unexpected results and are therefore non-obvious over the prior art and in condition for allowance. Withdrawal of the rejections against Claims 1-4 is requested. Favorable consideration and prompt allowance of claims 1-4 and 6-13 is earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, Examiner is invited to contact Applicant's undersigned representative at the telephone number listed below.

Respectfully submitted,

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Enclosure: Data tables A, B, C, C1-C12, and D

Table A

Supplemental Examples	ingredient for reducing haze level			ingredient for enhancing polishing rates		Haze level	LPD	Surface Condition
	name	MW ($\times 10^3$)	wt%	name	wt%			
1a	HEC	1200	0.01	PEO 150~400	0.1	⊙	Δ	-
1	HEC	1200	0.1	PEO 150~400	0.1	⊙	Δ	-
2a	HEC	1200	0.25	PEO 150~400	0.005	⊙	Δ	○
2	HEC	1200	0.25	PEO 150~400	0.01	⊙	Δ	○
3	HEC	1200	0.25	PEO 150~400	0.1	☆	Δ	⊙
5	HEC	1200	0.25	PEO 150~400	0.3	⊙	Δ	⊙
5a	HEC	1200	0.25	PEO 150~400	0.5	⊙	Δ	-
6	HEC	1200	0.5	PEO 150~400	0.1	⊙	Δ	-
6a	HEC	1200	1	PEO 150~400	0.1	⊙	Δ	-

HEC: hydroxyethyl cellulose

PEO: polyethylene oxide

AM: 29 wt% ammonium solution

As for evaluation of polishing results, see the specification

Examples 1-3, 5, and 6 were described in the originally filed specification

Examples 1a, 2a, 5a, and 6a are previously presented



Table B

Supplemental Comparative Examples	ingredient for reducing haze level			ingredient for enhancing polishing rates		Haze level	LPD	Surface Condition
	name	MW ($\times 10^3$)	wt%	name	MW ($\times 10^3$)	wt%		
Comp. Ex. 5a	HEC	1200	0.01	-	-	-	△	X
Comp. Ex. 5b	HEC	1200	0.1	-	-	-	○	△
Comp. Ex. 5	HEC	1200	0.25	-	-	-	○	△
Comp. Ex. 5c	HEC	1200	0.5	-	-	-	○	△
Comp. Ex. 5d	HEC	1200	1	-	-	-	○	X
Comp. Ex. 9a	-	-	-	PEO	150~400	0.005	AM	1.0
Comp. Ex. 9b	-	-	-	PEO	150~400	0.01	AM	1.0
Comp. Ex. 9	-	-	-	PEO	150~400	0.1	AM	1.0
Comp. Ex 9c	-	-	-	PEO	150~400	0.3	AM	1.0
Comp. Ex. 9d	-	-	-	PEO	150~400	0.5	AM	1.0

HEC: hydroxyethyl cellulose

PEO: polyethylene oxide

AM: 29 wt% amonium solution

As for evaluation of polishing results, see the specification

Comparative Examples 5 and 9 were described in the originally filed specification

Comparative Examples 5a-5d and 9a-9d are previously presented

Table C All C table data

Example#	HEC MW (x10 ³)	HEC wt%	PEO MW (x10 ³)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
1	300	0.05	80-120	0.005	AM	1.0	●	△	○
2	1,200	0.05	80-120	0.005	AM	1.0	●	△	-
3	1,800	0.05	80-120	0.005	AM	1.0	●	△	○
4	300	0.25	80-120	0.005	AM	1.0	●	△	-
5	1,200	0.25	80-120	0.005	AM	1.0	●	△	●
6	1,800	0.25	80-120	0.005	AM	1.0	●	△	-
7	300	2	80-120	0.005	AM	1.0	●	△	-
8	1,200	2	80-120	0.005	AM	1.0	●	△	-
9	1,800	2	80-120	0.005	AM	1.0	●	△	○
10	300	0.05	150-400	0.005	AM	1.0	●	△	-
11	1,200	0.05	150-400	0.005	AM	1.0	●	△	-
12	1,800	0.05	150-400	0.005	AM	1.0	●	△	-
13	300	0.25	150-400	0.005	AM	1.0	●	△	-
14	1,200	0.25	150-400	0.005	AM	1.0	●	△	○
15	1,800	0.25	150-400	0.005	AM	1.0	●	△	-
16	300	2	150-400	0.005	AM	1.0	●	△	○
17	1,200	2	150-400	0.005	AM	1.0	●	△	-
18	1,800	2	150-400	0.005	AM	1.0	●	△	-
19	300	0.05	6000-8000	0.005	AM	1.0	●	△	○
20	1,200	0.05	6000-8000	0.005	AM	1.0	●	△	-
21	1,800	0.05	6000-8000	0.005	AM	1.0	●	△	-
22	300	0.25	6000-8000	0.005	AM	1.0	●	△	-
23	1,200	0.25	6000-8000	0.005	AM	1.0	●	△	●
24	1,800	0.25	6000-8000	0.005	AM	1.0	●	△	-
25	300	2	6000-8000	0.005	AM	1.0	●	△	-
26	1,200	2	6000-8000	0.005	AM	1.0	●	△	-
27	1,800	2	6000-8000	0.005	AM	1.0	●	△	○
28	300	0.05	80-120	0.1	AM	1.0	●	△	-
29	1,200	0.05	80-120	0.1	AM	1.0	●	△	-
30	1,800	0.05	80-120	0.1	AM	1.0	●	△	-
31	300	0.25	80-120	0.1	AM	1.0	☆	△	●
32	1,200	0.25	80-120	0.1	AM	1.0	☆	△	-
33	1,800	0.25	80-120	0.1	AM	1.0	☆	△	-
34	300	2	80-120	0.1	AM	1.0	●	△	-
35	1,200	2	80-120	0.1	AM	1.0	●	△	-
36	1,800	2	80-120	0.1	AM	1.0	●	△	-
37	300	0.05	150-400	0.1	AM	1.0	●	△	●
38	1,200	0.05	150-400	0.1	AM	1.0	●	△	-
39	1,800	0.05	150-400	0.1	AM	1.0	●	△	-
40	300	0.25	150-400	0.1	AM	1.0	☆	△	-
41	1,200	0.25	150-400	0.1	AM	1.0	☆	△	●
42	1,800	0.25	150-400	0.1	AM	1.0	☆	△	-
43	300	2	150-400	0.1	AM	1.0	●	△	-
44	1,200	2	150-400	0.1	AM	1.0	●	△	-
45	1,800	2	150-400	0.1	AM	1.0	●	△	●
46	300	0.05	6000-8000	0.1	AM	1.0	●	△	-
47	1,200	0.05	6000-8000	0.1	AM	1.0	●	△	●
48	1,800	0.05	6000-8000	0.1	AM	1.0	●	△	-
49	300	0.25	6000-8000	0.1	AM	1.0	☆	△	-
50	1,200	0.25	6000-8000	0.1	AM	1.0	☆	△	●
51	1,800	0.25	6000-8000	0.1	AM	1.0	☆	△	-
52	300	2	6000-8000	0.1	AM	1.0	●	△	-
53	1,200	2	6000-8000	0.1	AM	1.0	●	△	●
54	1,800	2	6000-8000	0.1	AM	1.0	●	△	-
55	300	0.05	80-120	0.5	AM	1.0	●	△	-
56	1,200	0.05	80-120	0.5	AM	1.0	●	△	-
57	1,800	0.05	80-120	0.5	AM	1.0	●	△	○
58	300	0.25	80-120	0.5	AM	1.0	●	△	○
59	1,200	0.25	80-120	0.5	AM	1.0	●	△	-
60	1,800	0.25	80-120	0.5	AM	1.0	●	△	-
61	300	2	80-120	0.5	AM	1.0	●	△	-
62	1,200	2	80-120	0.5	AM	1.0	●	△	○
63	1,800	2	80-120	0.5	AM	1.0	●	△	-
64	300	0.05	150-400	0.5	AM	1.0	●	△	-
65	1,200	0.05	150-400	0.5	AM	1.0	●	△	●
66	1,800	0.05	150-400	0.5	AM	1.0	●	△	-
67	300	0.25	150-400	0.5	AM	1.0	●	△	-
68	1,200	0.25	150-400	0.5	AM	1.0	●	△	●
69	1,800	0.25	150-400	0.5	AM	1.0	●	△	-
70	300	2	150-400	0.5	AM	1.0	●	△	-
71	1,200	2	150-400	0.5	AM	1.0	●	△	-
72	1,800	2	150-400	0.5	AM	1.0	●	△	○
73	300	0.05	6000-8000	0.5	AM	1.0	●	△	-
74	1,200	0.05	6000-8000	0.5	AM	1.0	●	△	-
75	1,800	0.05	6000-8000	0.5	AM	1.0	●	△	○
76	300	0.25	6000-8000	0.5	AM	1.0	●	△	-
77	1,200	0.25	6000-8000	0.5	AM	1.0	●	△	-
78	1,800	0.25	6000-8000	0.5	AM	1.0	●	△	-
79	300	2	6000-8000	0.5	AM	1.0	●	△	-
80	1,200	2	6000-8000	0.5	AM	1.0	●	△	-
81	1,800	2	6000-8000	0.5	AM	1.0	●	△	○

Table C1 (HEC MW is fixed at a low end value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
1	300	0.05	80~120	0.005	AM	1.0	⊙	△	○
4	300	0.25	80~120	0.005	AM	1.0	⊙	△	-
7	300	2	80~120	0.005	AM	1.0	⊙	△	-
10	300	0.05	150~400	0.005	AM	1.0	⊙	△	-
13	300	0.25	150~400	0.005	AM	1.0	⊙	△	-
16	300	2	150~400	0.005	AM	1.0	⊙	△	○
19	300	0.05	6000~8000	0.005	AM	1.0	⊙	△	○
22	300	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
25	300	2	6000~8000	0.005	AM	1.0	⊙	△	-
28	300	0.05	80~120	0.1	AM	1.0	⊙	△	-
31	300	0.25	80~120	0.1	AM	1.0	☆	△	⊙
34	300	2	80~120	0.1	AM	1.0	⊙	△	-
37	300	0.05	150~400	0.1	AM	1.0	⊙	△	⊙
40	300	0.25	150~400	0.1	AM	1.0	☆	△	-
43	300	2	150~400	0.1	AM	1.0	⊙	△	-
46	300	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
49	300	0.25	6000~8000	0.1	AM	1.0	☆	△	-
52	300	2	6000~8000	0.1	AM	1.0	⊙	△	-
55	300	0.05	80~120	0.5	AM	1.0	⊙	△	-
58	300	0.25	80~120	0.5	AM	1.0	⊙	△	○
61	300	2	80~120	0.5	AM	1.0	⊙	△	-
64	300	0.05	150~400	0.5	AM	1.0	⊙	△	-
67	300	0.25	150~400	0.5	AM	1.0	⊙	△	-
70	300	2	150~400	0.5	AM	1.0	⊙	△	-
73	300	0.05	6000~8000	0.5	AM	1.0	⊙	△	-
76	300	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
79	300	2	6000~8000	0.5	AM	1.0	⊙	△	-

Table C2 (HEC MW is fixed at a mid range value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
2	1,200	0.05	80~120	0.005	AM	1.0	⊙	△	-
5	1,200	0.25	80~120	0.005	AM	1.0	⊙	△	⊙
8	1,200	2	80~120	0.005	AM	1.0	⊙	△	-
11	1,200	0.05	150~400	0.005	AM	1.0	⊙	△	-
14	1,200	0.25	150~400	0.005	AM	1.0	⊙	△	○
17	1,200	2	150~400	0.005	AM	1.0	⊙	△	-
20	1,200	0.05	6000~8000	0.005	AM	1.0	⊙	△	-
23	1,200	0.25	6000~8000	0.005	AM	1.0	⊙	△	⊙
26	1,200	2	6000~8000	0.005	AM	1.0	⊙	△	-
29	1,200	0.05	80~120	0.1	AM	1.0	⊙	△	-
32	1,200	0.25	80~120	0.1	AM	1.0	☆	△	-
35	1,200	2	80~120	0.1	AM	1.0	⊙	△	-
38	1,200	0.05	150~400	0.1	AM	1.0	⊙	△	-
41	1,200	0.25	150~400	0.1	AM	1.0	☆	△	⊙
44	1,200	2	150~400	0.1	AM	1.0	⊙	△	-
47	1,200	0.05	6000~8000	0.1	AM	1.0	⊙	△	⊙
50	1,200	0.25	6000~8000	0.1	AM	1.0	☆	△	⊙
53	1,200	2	6000~8000	0.1	AM	1.0	⊙	△	⊙
56	1,200	0.05	80~120	0.5	AM	1.0	⊙	△	-
59	1,200	0.25	80~120	0.5	AM	1.0	⊙	△	-
62	1,200	2	80~120	0.5	AM	1.0	⊙	△	○
65	1,200	0.05	150~400	0.5	AM	1.0	⊙	△	⊙
68	1,200	0.25	150~400	0.5	AM	1.0	⊙	△	⊙
71	1,200	2	150~400	0.5	AM	1.0	⊙	△	-
74	1,200	0.05	6000~8000	0.5	AM	1.0	⊙	△	-
77	1,200	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
80	1,200	2	6000~8000	0.5	AM	1.0	⊙	△	-

Table C3 (HEC MW is fixed at a high value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
3	1,800	0.05	80~120	0.005	AM	1.0	⊙	△	○
6	1,800	0.25	80~120	0.005	AM	1.0	⊙	△	-
9	1,800	2	80~120	0.005	AM	1.0	⊙	△	○
12	1,800	0.05	150~400	0.005	AM	1.0	⊙	△	-
15	1,800	0.25	150~400	0.005	AM	1.0	⊙	△	-
18	1,800	2	150~400	0.005	AM	1.0	⊙	△	-
21	1,800	0.05	6000~8000	0.005	AM	1.0	⊙	△	-
24	1,800	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
27	1,800	2	6000~8000	0.005	AM	1.0	⊙	△	○
30	1,800	0.05	80~120	0.1	AM	1.0	⊙	△	-
33	1,800	0.25	80~120	0.1	AM	1.0	☆	△	-
36	1,800	2	80~120	0.1	AM	1.0	⊙	△	-
39	1,800	0.05	150~400	0.1	AM	1.0	⊙	△	-
42	1,800	0.25	150~400	0.1	AM	1.0	☆	△	-
45	1,800	2	150~400	0.1	AM	1.0	⊙	△	⊙
48	1,800	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
51	1,800	0.25	6000~8000	0.1	AM	1.0	☆	△	-
54	1,800	2	6000~8000	0.1	AM	1.0	⊙	△	-
57	1,800	0.05	80~120	0.5	AM	1.0	⊙	△	○
60	1,800	0.25	80~120	0.5	AM	1.0	⊙	△	-
63	1,800	2	80~120	0.5	AM	1.0	⊙	△	-
66	1,800	0.05	150~400	0.5	AM	1.0	⊙	△	-
69	1,800	0.25	150~400	0.5	AM	1.0	⊙	△	-
72	1,800	2	150~400	0.5	AM	1.0	⊙	△	○
75	1,800	0.05	6000~8000	0.5	AM	1.0	⊙	△	○
78	1,800	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
81	1,800	2	6000~8000	0.5	AM	1.0	⊙	△	○

Table C4 (HEC wt% is fixed at a low value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
1	300	0.05	80~120	0.005	AM	1.0	⊙	Δ	○
2	1,200	0.05	80~120	0.005	AM	1.0	⊙	Δ	-
3	1,800	0.05	80~120	0.005	AM	1.0	⊙	Δ	○
10	300	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
11	1,200	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
12	1,800	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
19	300	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	○
20	1,200	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	-
21	1,800	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	-
28	300	0.05	80~120	0.1	AM	1.0	⊙	Δ	-
29	1,200	0.05	80~120	0.1	AM	1.0	⊙	Δ	-
30	1,800	0.05	80~120	0.1	AM	1.0	⊙	Δ	-
37	300	0.05	150~400	0.1	AM	1.0	⊙	Δ	⊙
38	1,200	0.05	150~400	0.1	AM	1.0	⊙	Δ	-
39	1,800	0.05	150~400	0.1	AM	1.0	⊙	Δ	-
46	300	0.05	6000~8000	0.1	AM	1.0	⊙	Δ	-
47	1,200	0.05	6000~8000	0.1	AM	1.0	⊙	Δ	⊙
48	1,800	0.05	6000~8000	0.1	AM	1.0	⊙	Δ	-
55	300	0.05	80~120	0.5	AM	1.0	⊙	Δ	-
56	1,200	0.05	80~120	0.5	AM	1.0	⊙	Δ	-
57	1,800	0.05	80~120	0.5	AM	1.0	⊙	Δ	○
64	300	0.05	150~400	0.5	AM	1.0	⊙	Δ	-
65	1,200	0.05	150~400	0.5	AM	1.0	⊙	Δ	⊙
66	1,800	0.05	150~400	0.5	AM	1.0	⊙	Δ	-
73	300	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	-
74	1,200	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	-
75	1,800	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	○

Table C5 (HEC wt% is fixed at a mid range value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
4	300	0.25	80~120	0.005	AM	1.0	⊙	△	-
5	1,200	0.25	80~120	0.005	AM	1.0	⊙	△	⊙
6	1,800	0.25	80~120	0.005	AM	1.0	⊙	△	-
13	300	0.25	150~400	0.005	AM	1.0	⊙	△	-
14	1,200	0.25	150~400	0.005	AM	1.0	⊙	△	○
15	1,800	0.25	150~400	0.005	AM	1.0	⊙	△	-
22	300	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
23	1,200	0.25	6000~8000	0.005	AM	1.0	⊙	△	⊙
24	1,800	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
31	300	0.25	80~120	0.1	AM	1.0	☆	△	⊙
32	1,200	0.25	80~120	0.1	AM	1.0	☆	△	-
33	1,800	0.25	80~120	0.1	AM	1.0	☆	△	-
40	300	0.25	150~400	0.1	AM	1.0	☆	△	-
41	1,200	0.25	150~400	0.1	AM	1.0	☆	△	⊙
42	1,800	0.25	150~400	0.1	AM	1.0	☆	△	-
49	300	0.25	6000~8000	0.1	AM	1.0	☆	△	-
50	1,200	0.25	6000~8000	0.1	AM	1.0	☆	△	⊙
51	1,800	0.25	6000~8000	0.1	AM	1.0	☆	△	-
58	300	0.25	80~120	0.5	AM	1.0	⊙	△	○
59	1,200	0.25	80~120	0.5	AM	1.0	⊙	△	-
60	1,800	0.25	80~120	0.5	AM	1.0	⊙	△	-
67	300	0.25	150~400	0.5	AM	1.0	⊙	△	-
68	1,200	0.25	150~400	0.5	AM	1.0	⊙	△	⊙
69	1,800	0.25	150~400	0.5	AM	1.0	⊙	△	-
76	300	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
77	1,200	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
78	1,800	0.25	6000~8000	0.5	AM	1.0	⊙	△	-

Table C6 (HEC wt% is fixed at a high value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
7	300	2	80~120	0.005	AM	1.0	⊙	△	-
8	1,200	2	80~120	0.005	AM	1.0	⊙	△	-
9	1,800	2	80~120	0.005	AM	1.0	⊙	△	○
16	300	2	150~400	0.005	AM	1.0	⊙	△	○
17	1,200	2	150~400	0.005	AM	1.0	⊙	△	-
18	1,800	2	150~400	0.005	AM	1.0	⊙	△	-
25	300	2	6000~8000	0.005	AM	1.0	⊙	△	-
26	1,200	2	6000~8000	0.005	AM	1.0	⊙	△	-
27	1,800	2	6000~8000	0.005	AM	1.0	⊙	△	○
34	300	2	80~120	0.1	AM	1.0	⊙	△	-
35	1,200	2	80~120	0.1	AM	1.0	⊙	△	-
36	1,800	2	80~120	0.1	AM	1.0	⊙	△	-
43	300	2	150~400	0.1	AM	1.0	⊙	△	-
44	1,200	2	150~400	0.1	AM	1.0	⊙	△	-
45	1,800	2	150~400	0.1	AM	1.0	⊙	△	⊙
52	300	2	6000~8000	0.1	AM	1.0	⊙	△	-
53	1,200	2	6000~8000	0.1	AM	1.0	⊙	△	⊙
54	1,800	2	6000~8000	0.1	AM	1.0	⊙	△	-
61	300	2	80~120	0.5	AM	1.0	⊙	△	-
62	1,200	2	80~120	0.5	AM	1.0	⊙	△	○
63	1,800	2	80~120	0.5	AM	1.0	⊙	△	-
70	300	2	150~400	0.5	AM	1.0	⊙	△	-
71	1,200	2	150~400	0.5	AM	1.0	⊙	△	-
72	1,800	2	150~400	0.5	AM	1.0	⊙	△	○
79	300	2	6000~8000	0.5	AM	1.0	⊙	△	-
80	1,200	2	6000~8000	0.5	AM	1.0	⊙	△	-
81	1,800	2	6000~8000	0.5	AM	1.0	⊙	△	○

Table C7 (PEO MW is fixed at a low value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
1	300	0.05	80~120	0.005	AM	1.0	⊙	△	○
2	1,200	0.05	80~120	0.005	AM	1.0	⊙	△	-
3	1,800	0.05	80~120	0.005	AM	1.0	⊙	△	○
4	300	0.25	80~120	0.005	AM	1.0	⊙	△	-
5	1,200	0.25	80~120	0.005	AM	1.0	⊙	△	⊙
6	1,800	0.25	80~120	0.005	AM	1.0	⊙	△	-
7	300	2	80~120	0.005	AM	1.0	⊙	△	-
8	1,200	2	80~120	0.005	AM	1.0	⊙	△	-
9	1,800	2	80~120	0.005	AM	1.0	⊙	△	○
28	300	0.05	80~120	0.1	AM	1.0	⊙	△	-
29	1,200	0.05	80~120	0.1	AM	1.0	⊙	△	-
30	1,800	0.05	80~120	0.1	AM	1.0	⊙	△	-
31	300	0.25	80~120	0.1	AM	1.0	☆	△	⊙
32	1,200	0.25	80~120	0.1	AM	1.0	☆	△	-
33	1,800	0.25	80~120	0.1	AM	1.0	☆	△	-
34	300	2	80~120	0.1	AM	1.0	⊙	△	-
35	1,200	2	80~120	0.1	AM	1.0	⊙	△	-
36	1,800	2	80~120	0.1	AM	1.0	⊙	△	-
55	300	0.05	80~120	0.5	AM	1.0	⊙	△	-
56	1,200	0.05	80~120	0.5	AM	1.0	⊙	△	-
57	1,800	0.05	80~120	0.5	AM	1.0	⊙	△	○
58	300	0.25	80~120	0.5	AM	1.0	⊙	△	○
59	1,200	0.25	80~120	0.5	AM	1.0	⊙	△	-
60	1,800	0.25	80~120	0.5	AM	1.0	⊙	△	-
61	300	2	80~120	0.5	AM	1.0	⊙	△	-
62	1,200	2	80~120	0.5	AM	1.0	⊙	△	○
63	1,800	2	80~120	0.5	AM	1.0	⊙	△	-

Table C8 (PEO MW is fixed at a mid range value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
10	300	0.05	150~400	0.005	AM	1.0	⊙	△	-
11	1,200	0.05	150~400	0.005	AM	1.0	⊙	△	-
12	1,800	0.05	150~400	0.005	AM	1.0	⊙	△	-
13	300	0.25	150~400	0.005	AM	1.0	⊙	△	-
14	1,200	0.25	150~400	0.005	AM	1.0	⊙	△	○
15	1,800	0.25	150~400	0.005	AM	1.0	⊙	△	-
16	300	2	150~400	0.005	AM	1.0	⊙	△	○
17	1,200	2	150~400	0.005	AM	1.0	⊙	△	-
18	1,800	2	150~400	0.005	AM	1.0	⊙	△	-
37	300	0.05	150~400	0.1	AM	1.0	⊙	△	⊙
38	1,200	0.05	150~400	0.1	AM	1.0	⊙	△	-
39	1,800	0.05	150~400	0.1	AM	1.0	⊙	△	-
40	300	0.25	150~400	0.1	AM	1.0	☆	△	-
41	1,200	0.25	150~400	0.1	AM	1.0	☆	△	⊙
42	1,800	0.25	150~400	0.1	AM	1.0	☆	△	-
43	300	2	150~400	0.1	AM	1.0	⊙	△	-
44	1,200	2	150~400	0.1	AM	1.0	⊙	△	-
45	1,800	2	150~400	0.1	AM	1.0	⊙	△	⊙
64	300	0.05	150~400	0.5	AM	1.0	⊙	△	-
65	1,200	0.05	150~400	0.5	AM	1.0	⊙	△	⊙
66	1,800	0.05	150~400	0.5	AM	1.0	⊙	△	-
67	300	0.25	150~400	0.5	AM	1.0	⊙	△	-
68	1,200	0.25	150~400	0.5	AM	1.0	⊙	△	⊙
69	1,800	0.25	150~400	0.5	AM	1.0	⊙	△	-
70	300	2	150~400	0.5	AM	1.0	⊙	△	-
71	1,200	2	150~400	0.5	AM	1.0	⊙	△	-
72	1,800	2	150~400	0.5	AM	1.0	⊙	△	○

Table C9 (PEO MW is fixed at a high value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
19	300	0.05	6000~8000	0.005	AM	1.0	⊙	△	○
20	1,200	0.05	6000~8000	0.005	AM	1.0	⊙	△	-
21	1,800	0.05	6000~8000	0.005	AM	1.0	⊙	△	-
22	300	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
23	1,200	0.25	6000~8000	0.005	AM	1.0	⊙	△	⊙
24	1,800	0.25	6000~8000	0.005	AM	1.0	⊙	△	-
25	300	2	6000~8000	0.005	AM	1.0	⊙	△	-
26	1,200	2	6000~8000	0.005	AM	1.0	⊙	△	-
27	1,800	2	6000~8000	0.005	AM	1.0	⊙	△	○
46	300	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
47	1,200	0.05	6000~8000	0.1	AM	1.0	⊙	△	⊙
48	1,800	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
49	300	0.25	6000~8000	0.1	AM	1.0	☆	△	-
50	1,200	0.25	6000~8000	0.1	AM	1.0	☆	△	⊙
51	1,800	0.25	6000~8000	0.1	AM	1.0	☆	△	-
52	300	2	6000~8000	0.1	AM	1.0	⊙	△	-
53	1,200	2	6000~8000	0.1	AM	1.0	⊙	△	⊙
54	1,800	2	6000~8000	0.1	AM	1.0	⊙	△	-
73	300	0.05	6000~8000	0.5	AM	1.0	⊙	△	-
74	1,200	0.05	6000~8000	0.5	AM	1.0	⊙	△	-
75	1,800	0.05	6000~8000	0.5	AM	1.0	⊙	△	○
76	300	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
77	1,200	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
78	1,800	0.25	6000~8000	0.5	AM	1.0	⊙	△	-
79	300	2	6000~8000	0.5	AM	1.0	⊙	△	-
80	1,200	2	6000~8000	0.5	AM	1.0	⊙	△	-
81	1,800	2	6000~8000	0.5	AM	1.0	⊙	△	○

Table C10 (PEO wt% is fixed at a low end value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
1	300	0.05	80~120	0.005	AM	1.0	⊙	Δ	○
2	1,200	0.05	80~120	0.005	AM	1.0	⊙	Δ	-
3	1,800	0.05	80~120	0.005	AM	1.0	⊙	Δ	○
4	300	0.25	80~120	0.005	AM	1.0	⊙	Δ	-
5	1,200	0.25	80~120	0.005	AM	1.0	⊙	Δ	⊙
6	1,800	0.25	80~120	0.005	AM	1.0	⊙	Δ	-
7	300	2	80~120	0.005	AM	1.0	⊙	Δ	-
8	1,200	2	80~120	0.005	AM	1.0	⊙	Δ	-
9	1,800	2	80~120	0.005	AM	1.0	⊙	Δ	○
10	300	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
11	1,200	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
12	1,800	0.05	150~400	0.005	AM	1.0	⊙	Δ	-
13	300	0.25	150~400	0.005	AM	1.0	⊙	Δ	-
14	1,200	0.25	150~400	0.005	AM	1.0	⊙	Δ	○
15	1,800	0.25	150~400	0.005	AM	1.0	⊙	Δ	-
16	300	2	150~400	0.005	AM	1.0	⊙	Δ	○
17	1,200	2	150~400	0.005	AM	1.0	⊙	Δ	-
18	1,800	2	150~400	0.005	AM	1.0	⊙	Δ	-
19	300	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	○
20	1,200	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	-
21	1,800	0.05	6000~8000	0.005	AM	1.0	⊙	Δ	-
22	300	0.25	6000~8000	0.005	AM	1.0	⊙	Δ	-
23	1,200	0.25	6000~8000	0.005	AM	1.0	⊙	Δ	⊙
24	1,800	0.25	6000~8000	0.005	AM	1.0	⊙	Δ	-
25	300	2	6000~8000	0.005	AM	1.0	⊙	Δ	-
26	1,200	2	6000~8000	0.005	AM	1.0	⊙	Δ	-
27	1,800	2	6000~8000	0.005	AM	1.0	⊙	Δ	○

Table C11 (PEO wt% is fixed at a mid range value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
28	300	0.05	80~120	0.1	AM	1.0	⊙	△	-
29	1,200	0.05	80~120	0.1	AM	1.0	⊙	△	-
30	1,800	0.05	80~120	0.1	AM	1.0	⊙	△	-
31	300	0.25	80~120	0.1	AM	1.0	☆	△	⊙
32	1,200	0.25	80~120	0.1	AM	1.0	☆	△	-
33	1,800	0.25	80~120	0.1	AM	1.0	☆	△	-
34	300	2	80~120	0.1	AM	1.0	⊙	△	-
35	1,200	2	80~120	0.1	AM	1.0	⊙	△	-
36	1,800	2	80~120	0.1	AM	1.0	⊙	△	-
37	300	0.05	150~400	0.1	AM	1.0	⊙	△	⊙
38	1,200	0.05	150~400	0.1	AM	1.0	⊙	△	-
39	1,800	0.05	150~400	0.1	AM	1.0	⊙	△	-
40	300	0.25	150~400	0.1	AM	1.0	☆	△	-
41	1,200	0.25	150~400	0.1	AM	1.0	☆	△	⊙
42	1,800	0.25	150~400	0.1	AM	1.0	☆	△	-
43	300	2	150~400	0.1	AM	1.0	⊙	△	-
44	1,200	2	150~400	0.1	AM	1.0	⊙	△	-
45	1,800	2	150~400	0.1	AM	1.0	⊙	△	⊙
46	300	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
47	1,200	0.05	6000~8000	0.1	AM	1.0	⊙	△	⊙
48	1,800	0.05	6000~8000	0.1	AM	1.0	⊙	△	-
49	300	0.25	6000~8000	0.1	AM	1.0	☆	△	-
50	1,200	0.25	6000~8000	0.1	AM	1.0	☆	△	⊙
51	1,800	0.25	6000~8000	0.1	AM	1.0	☆	△	-
52	300	2	6000~8000	0.1	AM	1.0	⊙	△	-
53	1,200	2	6000~8000	0.1	AM	1.0	⊙	△	⊙
54	1,800	2	6000~8000	0.1	AM	1.0	⊙	△	-

Table C12 (PEO wt% is fixed at a high end value)

Example#	HEC MW ($\times 10^3$)	HEC wt%	PEO MW ($\times 10^3$)	PEO wt%	Alkaline	Alkaline wt%	Haze Level	LPD	Surface Condition
55	300	0.05	80~120	0.5	AM	1.0	⊙	Δ	-
56	1,200	0.05	80~120	0.5	AM	1.0	⊙	Δ	-
57	1,800	0.05	80~120	0.5	AM	1.0	⊙	Δ	○
58	300	0.25	80~120	0.5	AM	1.0	⊙	Δ	○
59	1,200	0.25	80~120	0.5	AM	1.0	⊙	Δ	-
60	1,800	0.25	80~120	0.5	AM	1.0	⊙	Δ	-
61	300	2	80~120	0.5	AM	1.0	⊙	Δ	-
62	1,200	2	80~120	0.5	AM	1.0	⊙	Δ	○
63	1,800	2	80~120	0.5	AM	1.0	⊙	Δ	-
64	300	0.05	150~400	0.5	AM	1.0	⊙	Δ	-
65	1,200	0.05	150~400	0.5	AM	1.0	⊙	Δ	⊙
66	1,800	0.05	150~400	0.5	AM	1.0	⊙	Δ	-
67	300	0.25	150~400	0.5	AM	1.0	⊙	Δ	-
68	1,200	0.25	150~400	0.5	AM	1.0	⊙	Δ	⊙
69	1,800	0.25	150~400	0.5	AM	1.0	⊙	Δ	-
70	300	2	150~400	0.5	AM	1.0	⊙	Δ	-
71	1,200	2	150~400	0.5	AM	1.0	⊙	Δ	-
72	1,800	2	150~400	0.5	AM	1.0	⊙	Δ	○
73	300	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	-
74	1,200	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	-
75	1,800	0.05	6000~8000	0.5	AM	1.0	⊙	Δ	○
76	300	0.25	6000~8000	0.5	AM	1.0	⊙	Δ	-
77	1,200	0.25	6000~8000	0.5	AM	1.0	⊙	Δ	-
78	1,800	0.25	6000~8000	0.5	AM	1.0	⊙	Δ	-
79	300	2	6000~8000	0.5	AM	1.0	⊙	Δ	-
80	1,200	2	6000~8000	0.5	AM	1.0	⊙	Δ	-
81	1,800	2	6000~8000	0.5	AM	1.0	⊙	Δ	○

Table D

Supplemental Example#	HEC MW (x10 ³)	HEC wt%	PEO MW (x10 ³)	PEO wt%	Alkaline	Alkaline wt%	Haze level	LPD	Surface Condition
1	1200	0.25	150~400	0.1	AM	1	☆	Δ	⊙
2	1200	0.25	150~400	0.1	AM	0.01	Δ	Δ	-
3	1200	0.25	150~400	0.1	AM	0.02	⊙	Δ	-
4	1200	0.25	150~400	0.1	AM	4	⊙	Δ	-
5	1200	0.25	150~400	0.1	AM	4.5	○	Δ	-
6	200	0.25	150~400	0.1	AM	1	○	Δ	-
7*	>2000	0.25	150~400	0.1	AM	1	N/A	N/A	N/A
8	1200	0.03	150~400	0.1	AM	1	Δ	Δ	-
9	1200	2.5	150~400	0.1	AM	1	Δ	Δ	-
10	1200	0.25	20~40	0.1	AM	1	○	Δ	-
11	1200	0.25	2,000~14,000	0.1	AM	1	Δ	Δ	-
12	1200	0.25	150~400	0.003	AM	1	○	Δ	-
13	1200	0.25	150~400	0.8	AM	1	Δ	Δ	-

* Example 7 could not be carried out because the applicant does not have HEC having Mw exceeding 2,000,000 on hand.